

**TABLE S4a****Genetic correlation coefficients among traits for DH (below diagonal) population in micro-environment N3**

Trait	Branch number	Biomass yield	Flowering time	Maturing time	Plant height	Pod number	Seed number	Seed weight	Seed yield
Branch number									
Biomass yield	/								
Flowering time	0.08	/							
Maturing time	-0.05	/	0.65***						
Plant height	0.07	/	0.52***	0.21**					
Pod number	0.43***	/	-0.06	-0.03	0.02				
Seed number	-0.10	/	0.22**	0.04	0.16*	-0.42***			
Seed weight	0.07	/	-0.29***	-0.18*	0.01	-0.18*	-0.37***		
Seed yield	0.35***	/	-0.16*	-0.06	0.22**	0.50***	0.46***	0.29***	

**TABLE S4b****Genetic correlation coefficients among traits for DH (below diagonal) population in micro-environment N4**

Trait	Branch number	Biomass yield	Flowering time	Maturing time	Plant height	Pod number	Seed number	Seed weight	Seed yield
Branch number									
Biomass yield	/								
Flowering time	-0.52***	/							
Maturing time	-0.60***	/	0.81***						
Plant height	0.01	/	0.42***	0.15*					
Pod number	0.01	/	0.22**	0.52***	0.35***				
Seed number	0.32***	/	-0.41***	-0.36***	-0.20**	-0.43***			
Seed weight	0.06	/	-0.03	0.30***	0.22**	-0.20**	-0.19*		

Seed yield	0.36***	/	-0.28***	0.09	0.25***	0.45***	0.40***	0.40***
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**TABLE S4c****Genetic correlation coefficients among traits for DH (below diagonal) and RC-F2 (up diagonal) populations in micro-environment N6**

Trait	Branch number	Biomass yield	Flowering time	Maturing time	Plant height	Pod number	Seed number	Seed weight	Seed yield
Branch number		0.27***	-0.45***	-0.48***	0.18*	0.27***	0.25***	0.05	0.45***
Biomass yield	0.08		0.27***	0.33***	0.74***	0.57***	-0.03	0.29***	0.73***
Flowering time	-0.39***	0.38***		0.73***	0.45***	0.18*	-0.29***	-0.16*	-0.22**
Maturing time	-0.42***	0.48***	0.73***		0.36***	0.06	-0.31***	0.10	-0.17*
Plant height	0.09	0.65***	0.53***	0.38***		0.50***	-0.09	0.27***	0.56***
Pod number	0.44***	0.56***	0.18*	0.02	0.47***		-0.31***	-0.21**	0.68***
Seed number	-0.01	-0.02	-0.21**	-0.19*	-0.05	-0.34***		-0.26***	0.29***
Seed weight	0.03	0.23**	-0.23***	-0.05	0.00	-0.29***	-0.23**		0.31***
Seed yield	0.43***	0.68***	-0.18*	-0.03	0.45***	0.58***	0.33***	0.22**	

**TABLE S4d****Genetic correlation coefficients among traits for DH (below diagonal) population in micro-environment N7**

Trait	Branch number	Biomass yield	Flowering time	Maturing time	Plant height	Pod number	Seed number	Seed weight	Seed yield
Branch number									
Biomass yield	/								
Flowering time	/	/							
Maturing time	/	/	0.61***						
Plant height	/	/	/	/					
Pod number	/	/	/	/	/				
Seed number	/	/	/	/	/	/			
Seed weight	/	/	/	/	/	/	/		
Seed yield	/	/	-0.30***	-0.42***	/	/	/	/	

**TABLE S4e****Genetic correlation coefficients among traits for DH (below diagonal) population in micro-environment S3**

Trait	Branch number	Biomass yield	Flowering time	Maturing time	Plant height	Pod number	Seed number	Seed weight	Seed yield
Branch number									
Biomass yield	/								
Flowering time	-0.23**	/							
Maturing time	-0.31***	/	0.67***						
Plant height	0.41***	/	0.01	0.21**					
Pod number	0.78***	/	-0.20**	-0.24**	0.49***				
Seed number	0.09	/	-0.08	-0.26***	0.03	0.01			
Seed weight	0.07	/	-0.26***	0.20**	0.07	-0.03	-0.17*		
Seed yield	0.65***	/	-0.40***	-0.35***	0.33***	0.68***	0.52***	0.24***	

**TABLE S4f****Genetic correlation coefficients among traits for DH (below diagonal) population in micro-environment S4**

Trait	Branch number	Biomass yield	Flowering time	Maturing time	Plant height	Pod number	Seed number	Seed weight	Seed yield
Branch number									
Biomass yield	/								
Flowering time	-0.32***	/							
Maturing time	-0.44***	/	0.79***						
Plant height	0.50***	/	-0.29***	-0.26***					
Pod number	0.58***	/	-0.68***	-0.73***	0.42***				
Seed number	-0.35***	/	0.30***	0.34***	-0.03	-0.47***			
Seed weight	0.28***	/	-0.33***	-0.27***	0.31***	-0.28***	-0.32***		
Seed yield	0.57***	/	-0.71***	-0.67***	0.58***	0.71***	0.37***	0.31***	

**TABLE S4g****Genetic correlation coefficients among traits for DH (below diagonal) and RC-F2 (up diagonal) populations in micro-environment S5**

Trait	Branch number	Biomass yield	Flowering time	Maturing time	Plant height	Pod number	Seed number	Seed weight	Seed yield
Branch number	/	-0.03	0.03	0.41***	0.37***	-0.03	-0.10	0.35***	
Biomass yield	/		/	/	/	/	/	/	/
Flowering time	-0.15*	/		0.51***	-0.10	0.34***	-0.06	-0.45***	0.04
Maturing time	-0.31***	/	0.59***		-0.04	0.23**	-0.39***	0.04	-0.05
Plant height	0.33***	/	0.01	0.06		0.22**	0.19*	0.22**	0.39***
Pod number	0.29***	/	0.40***	0.24**	0.16*		-0.36***	-0.40***	0.60***
Seed number	0.07	/	-0.09	-0.34***	0.22**	-0.29***		-0.30***	0.28***
Seed weight	-0.08	/	-0.45***	0.05	-0.06	-0.50***	-0.35***		0.05
Seed yield	0.42***	/	-0.18*	-0.22**	0.33***	0.43***	0.43***	-0.04	

**TABLE S4h****Genetic correlation coefficients among traits for DH (below diagonal) and RC-F2 (up diagonal) populations in micro-environment S6**

Trait	Branch number	Biomass yield	Flowering time	Maturing time	Plant height	Pod number	Seed number	Seed weight	Seed yield
Branch number	0.55***	-0.28***	-0.39***	0.30***	0.36***	0.27***	-0.25***	0.51***	
Biomass yield	0.35***		-0.10	-0.29***	0.61***	0.62***	0.25***	0.02	0.72***
Flowering time	0.00	0.08		0.60***	0.10	-0.39***	-0.18*	0.16*	-0.42***
Maturing time	-0.30***	0.09	0.60***		-0.16*	-0.35***	-0.28***	0.28***	-0.44***
Plant height	0.29***	0.68***	0.23**	-0.01		0.27***	0.25***	0.00	0.42***
Pod number	0.40***	0.51***	-0.30***	-0.44***	0.32***		-0.01	-0.31***	0.73***
Seed number	-0.10	-0.08	-0.15*	-0.18*	0.17*	-0.18*		-0.54***	0.47***
Seed weight	-0.02	0.02	-0.20**	0.19*	-0.09	-0.24**	-0.54***		0.20**
Seed yield	0.34***	0.64***	-0.36***	-0.48***	0.36***	0.69***	0.42***	0.16*	

**TABLE S4i****Genetic correlation coefficients among traits for DH (below diagonal) population in micro-environment S7**

Trait	Branch number	Biomass yield	Flowering time	Maturing time	Plant height	Pod number	Seed number	Seed weight	Seed yield
Branch number									
Biomass yield	/								
Flowering time	/	/							
Maturing time	/	/	0.77***						
Plant height	/	/	/	/					
Pod number	/	/	/	/	/				
Seed number	/	/	/	/	/	/			
Seed weight	/	/	-0.15*	0.07	/	/	/		
Seed yield	/	/	-0.54***	-0.45***	/	/	/	0.15*	

**TABLE S4j****Genetic correlation coefficients among traits for DH (below diagonal) population in micro-environment E7**

Trait	Branch number	Biomass yield	Flowering time	Maturing time	Plant height	Pod number	Seed number	Seed weight	Seed yield
Branch number									
Biomass yield	/								
Flowering time	/	/							
Maturing time	/	/	0.62***						
Plant height	/	/	/	/					
Pod number	/	/	/	/	/				
Seed number	/	/	/	/	/	/			
Seed weight	/	/	-0.37***	-0.24**	/	/	/		
Seed yield	/	/	-0.26***	-0.35***	/	/	/	0.25***	

\*, \*\* and \*\*\* represent the three significant levels of P=0.05, 0.01 and 0.001 respectively